

APPLICATION FOR
UNITED STATES LETTERS PATENT

TO ALL WHOM IT MAY CONCERN:

"Valve Stem Cap Removal Apparatus"

CROSS REFERENCE TO RELATED APPLICATIONS

Not applicable.

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH
OR DEVELOPMENT**

5

Not applicable.

REFERENCE TO MICROFICHE APPENDIX

Not applicable.

BACKGROUND OF THE INVENTION

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Field of the Invention

The present invention relates to the field of valve stem cap removal devices in general, and in particular to a valve stem cap removal apparatus having a resiliently deformable cap engagement member.

Description of Related Art

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As can be seen by reference to the following U.S. Patent Nos. 5,614,669; 3,928,902; Des. 399,107; and 4,528,735, the prior art is replete with automotive accessory tools designed for engagement with different portions of an automobile tire inflation valve stem assembly.

While all of the aforementioned prior art constructions are more than adequate for the basic purpose and function for which they have been specifically designed, they are uniformly deficient with respect to their failure to provide a simple, efficient, and practical valve stem cap removal apparatus having a resiliently deformable cap
5 engaging head member that facilitates the frictional engagement and removal of the valve stem cap.

Unfortunately when dealing with rigid cap engaging members, the valve stem must be almost perfectly aligned with the opening of the outside wheel of a dual wheel application in order to effectively utilize this type of tool; and, in many instances, the
10 valve stem is somewhat laterally offset from the aforementioned desired alignment.

As a consequence of the foregoing situation, there has existed a longstanding need for a new and improved valve stem cap removal apparatus that is designed to be both flexible and resiliently deformable to engage the cap on valve stems that are either not perfectly aligned with a wheel aperture or positioned on the inner wheel of a
15 dual wheel arrangement; and the provision of such a construction is a stated objective of the present invention.

BRIEF SUMMARY OF THE INVENTION

Briefly stated, the valve stem cap removal apparatus that forms the basis of the present invention comprises a resilient cap engaging unit the inboard end of which is
20 secured to the outboard end of an elongated generally rigid shaft member having an inboard end provided with an enlarged handle member.

As will be explained in greater detail further on in the specification, the cap engaging unit includes a generally resiliently deformable tubular cap engaging member preferably fabricated from rubber or flexible plastic wherein, the inboard end of the
25 tubular cap engaging member is dimensioned to frictionally engage the outboard end of the shaft member and wherein, the cap engaging member is adapted to frictionally engage the cap of a valve stem.

In addition, the tubular cap engaging member is further provided with a first securing band that captively engages the inboard end of the cap engaging member to
30 the outboard end of the shaft member, and a second tensioning band that limits the amount of deformation of the outboard end of the cap engaging member to

substantially retain the effective inside diameter of the outboard end of the cap engaging member after repeated usage.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

These and other attributes of the invention will become more clear upon a
5 thorough study of the following description of the best mode for carrying out the invention, particularly when reviewed in conjunction with the drawings, wherein:

FIG. 1 is a perspective view of the cap removal apparatus in use;

FIG. 2 is a cross-sectional view of the outboard end of the apparatus prior to
engaging the cap of a valve stem;

10 FIG. 3 is a cross-sectional view showing the engagement of the cap removal member with the cap of a valve stem; and,

FIG. 4 is a cross-sectional view showing the cap of a valve stem detached from the valve stem by the cap removal member.

DETAILED DESCRIPTION OF THE INVENTION

15 As can be seen by reference to the drawings, and in particularly to FIG. 1, the valve stem cap removal apparatus that forms the basis of the present invention is designated generally by the reference number **10**. The apparatus **10** comprises a cap removal unit **11** attached to a generally elongated shaft member **30** equipped with an enlarged handle member **40**. These structural components will now be described in
20 seriatim fashion.

As can best be seen by reference to Fig. 2, the cap removal unit **11** comprises in general a tubular cap engaging member **20** fabricated from a resiliently deformable material **21** such as rubber, flexible plastic or the like wherein, in the preferred
25 embodiment of the invention, the tubular cap engaging member **20** has a generally uniform diameter interior passageway **22**.

In addition, as depicted in Figs. 1 and 2, the exterior of the cap engaging member **20** is further provided with a first securing band **23** disposed proximate to its inboard end; and, a second tensioning band **24** spaced from the outboard end of the cap engaging member **20** wherein, the purpose and function of the securing **23** and
30 tensioning **24** bands will be explained in greater detail further on in the specification.

Still referring to Figs. 1 and 2, it can be seen that the generally elongated shaft member **30** is fabricated from a generally rigid material **31** wherein, the outboard end of the shaft member **30** is frictionally engaged by the inboard end of the interior passageway **22** of the cap engaging member **20** and held in place relative thereto by the crimping action of the securing band **23** in a well recognized manner.

As can also be appreciated by reference to Fig. 1, the inboard end of the shaft member **30** is fixedly secured in an enlarged handle member **40** having a frictionally enhanced external peripheral surface **41** wherein, the frictionally enhanced peripheral handle surface **41** may be accomplished by ribs, a frictional coating or material that the handle is fabricated from or a combination thereof.

Turning now to Figs. 2 through 5, it can be appreciated that the tensioning band **24** is provided to limit the amount of expansion of the outboard end of the central passageway **22** of the cap engaging member **20** as it engages, rotates, and removes the cap **101** of a tire inflation valve stem **100**.

Furthermore, the intermediate portion of the cap engaging member **20** may be resiliently deformed to gain access to a valve stem cap **101** on the inner wheel **200'** of a dual wheel arrangement **200** that would not be capable of being accessed by a rigid cap engaging element.

Although only an exemplary embodiment of the invention has been described in detail above, those skilled in the art will readily appreciate that many modifications are possible without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention as defined in the following claims.

Having thereby described the subject matter of the present invention, it should be apparent that many substitutions, modifications, and variations of the invention are possible in light of the above teachings. It is therefore to be understood that the invention as taught and described herein is only to be limited to the extent of the breadth and scope of the appended claims.